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Spontaneous Imitations in Language Delay: Alternative Strategies for Language Learning

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ABSTRACT

Weekly spontaneous imitations and spontaneous productions in the speech of two language-impaired Stage I males were compared over a ten-week period until MLU approached or exceeded 2.0 morphemes. Although imitation was extensive in both boys' output, consistency of imitation over time differed for both and was associated with ongoing changes in their lexicons. Imitation of multi-word utterances was selective to a small set of words, and this strategy accounted for significantly greater lexical diversity in subjects' imitative speech compared to their spontaneous speech. One child's imitative single- and multi-word lexicon became predominantly spontaneous over successive weeks, as did his imitative use of four contrastive semantic-syntactic relations. The second child's lexical imitations showed a shift only for words used as single-word utterances. Moreover, he demonstrated spontaneous control of several categorical rules for combining words at the outset of the study. Imitation for this subject appeared to primarily serve the function of introducing new lexical items into previously-practiced combinatorial patterns in his speech.

Although the question has been asked for a number of years, research has failed to provide the precise answer as to whether imitation plays a central role in the child's normal acquisition of language. Evidence thus far confirms that extensive use of imitation is not a prerequisite for learning language (Bloom, Hood and Lightbown, 1974; Ramer, 1976), nor does imitation inherently speed up the acquisition process (Ervin, 1964; Kemp & Dale, 1973; Ramer, 1976). Nevertheless, for those children who do imitate extensively, limited evidence suggests that their imitations are not only selective, but lexically and grammatically progressive in that structures used primarily in imitation come to be used predominantly in their spontaneous speech (Bloom et al., 1974; Moerk, 1977; Scherer & Olswang, 1984; Ramer, 1976).

Lack of certainty about the process of imitation and its relative influence on normal acquisition has confounded matters for the practitioner faced with decisions about how to introduce language to the minimally verbal child. Though there has been sufficient experimental evidence to justify the use of elicited imitation techniques for initiating vocal-verbal responding with the non-verbal child (Lovaas, Berberich, Perloff, & Schaeffer, 1966; Sherman, 1971), there are few naturalistic studies which have examined the relationship between non-elicited and spontaneous imitation and concomitant lexical and grammatical change in the language-impaired child's spontaneous speech. Exceptions are studies by Coggins and Morrison (1981) and Rondall (1978) who compared records of spontaneous speech and spontaneous imitations in Down's Syndrome children.

Coggins and Morrison (1981) found that though four of their Stage I subjects differed in how extensviely they imitated, over a limited four-week period, two of the most imitative subjects' productions were lexically selective; words imitated differed significantly from those used spontaneously.

Rondall (1978) reported that linguistically-matched normals and Down's children made less extensive use of imitation as their spontaneous MLUs increased from 1.00 to 3.00 morphemes, and that this outcome was associated with fewer imitations and expansions in the speech directed to them by their mothers. Other language-normal studies have reported a similar decline in the child's tendency to imitate with increased age and linguistic maturity (Seitz & Stewart, 1975; Bloom et al., 1974; Bloom, Roscissanno & Hood, 1976). Moreover, developmental changes in frequency and style of children's imitations appear to be related not only to increased syntactic abilities, but also to increasing sensitivity to conversational constraints in ongoing discourse (Bloom et al., 1976; Gallagher & Craig, 1984; Keenan, 1975; Van Kleeck & Frankel, 1981).

It would seem then, that imitation may best serve the child at a limited and perhaps critical period in his overall linguistic development. Imitation obviously is not necessary to teach the child to talk,, but it can assist acquisition of moderately novel and more complex lexical and syntactical forms for some children, as well as giving the very young child opportunity to participate as a partner in dialogue. If imitation is one of several strategies employed by the normal child in this way, its developmental role needs to be more extensively investigated in the language-impaired child. Indeed, the selective spontaneous imitations of these children have been overlooked as a potentially rich source of information about what they may be primed to acquire next. Assumptions are that many imitative utterances consist of rote-analyzed routines and/or 'marginal' forms not fully productive in the child's grammar. Consequently, investigators have questioned their inclusion in protocols for grammatical analysis (Brown, 1973; Chapman,1981; Ingram, 1981). Nonetheless, if longitudinal evidence were to indicate that impaired children make systematic use of imitation in assisting lexical and

grammatical development, there would be clinical justification for analyzing imitative corpora in arriving at a developmentally continuous and more comprehensive look at their linguistic systems.

The present case study reports on the imitative behavior of two language-impaired males over a ten-week period. Vital issues addressed by this study included whether imitation assisted the acquisition of new forms in the children's spontaneous speech. The extent and consistency of imitation and concomitant changes in the children's lexicons and grammars were compared. One hypothesis investigated whether subjects' imitations were contrastive with their spontaneous productions at given sampling periods throughout the study. A second issue examined whether imitation would predict significant lexical and semantic-syntactic gains in the subjects' spontaneous repertoires.

METHOD

Subjects

Two language-impaired males participated who were 3;10 and 4;11 years at the onset of the study. Primary determination of language delay was based on subjects' spontaneous MLUs and performance on a standard test of language comprehension (Test of Auditory Comprehension of Language , which fell more than two standard deviations below performance values predicted for their chronological ages as reported respectively by Miller and Chapman (1981) and Carrow (1974). Both children attended pre-school language intervention programs on a twice-weekly basis about nine months prior to the initiation of this study and were moderately intelligible; they possessed no known intellectual retardation (based on school testing records), or any physical abnormalities to the speech or hearing mechanism confirmed by peripheral oral-motor and hearing sensitivity examination. The eldest subject, Mike, had a spontaneous MLU of approximately 2.0 morphemes and the youngest, Jeff,

exhibited an MLU of about 1.6 morphemes at the onset of the study which placed them both in late Stage I (Brown, 1973).

Procedure

Language samples were tape-recorded at weekly intervals over ten consecutive weeks from conversations elicited during play activities between the child and others (immediate family and/or the classroom teacher and peers). Samples were transcribed including notes about situational context and behavior by two examiners following procedures specified by Bloom and Lahey (1978) for segmenting and coding verbal and non-verbal behavior. Sampling was conducted for approximately an hour and a-half or until at least 100 utterances could be obtained for weekly analysis. Spontaneous imitative utterances were operationally defined relative to Bloomn et al.'s (1974) criteria: Imitations were defined as exact or partial reductions of a preceding model if they occurred naturally and without prompting from an adult or peer, if they did not add to or alter the model utterance other than to omit linguistic elements, and if no more than five successive utterances (from the child or model) intervened between the model and the imitative utterance.

Mike's speech was tape-recorded by the second author in his pre-school setting once a week for ten consecutive weeks. Individual taping sessions lasted 60-90 minutes each and were collected during ongoing classroom activities with Mike's peers and teacher. The examiner transcribed speech and took contextual notes from a one-way mirrored observation room.

Jeff was seen at home once a week for ten weeks for 60 to 90-minute taping sessions.[1] Sessions included conversations and play between Jeff and one of his parents and/or older sister. The examiner, though present in the same room, interacted minimally with Jeff and only in response to his communicative initiations.

For reliability purposes, samples from six randomly selected sessions

(three sessions per subject) were independently transcribed by another judge. Inter-examiner agreement for word-by-word transcription and identification of utterances as imitative or spontaneous was computed by dividing the total number of whole word agreements by total word judgements, which resulted in a reliability coefficient that never was less than 0.90 for each session evaluated. Utterances which were unintelligible to both judges (less than one percent of each sample) were eliminated for analysis.

Analysis

Following Bloom et al.'s (1974) procedures, three analyses were performed on the weekly samples in order to determine the relative frequency and consistency of imitation. Spontaneous and imitative utterance types were separated and proportions were calculated for distinctly different utterances, (hereafter,'types'), used only spontaneously, only imitatively, or both imitatively and spontaneously.

A second analysis determined lexical diversity for each session. Lexical type-token ratios (TTRs) for imitative and spontaneous productions were computed for every distinctly different word type used singly and in multi-word utterances. Further statistical analyses were made to determine (1) whether there was a population of word types used in any given session that was primarily imitative or spontaneous, and (2) whether imitative word types would come to be used spontaneously across successive weeks. Finally, the semantic-syntactic function of all multi-word utterance types was calculated relative to their imitative/spontaneous use in successive weeks. An adaptation of Bloom et al.'s (1974) and Brown's (1973) taxonomies was created for identifying 14 possible semantic-syntactic relations common to Stage I speech.[2] The resulting coding scheme appears in the Appendix with definitions and speech examples.

An independent judge coded a randomly selected set of weekly speech

corpora (four for each subject) relative to this taxonomy. Mean reliability of agreement was .91 and .87 respectively for Mike and Jeff's utterance types.

RESULTS

Data for weekly samples appear in Table 1 including their length in hours, utterance size, proportion of uniquely different multi-word vs. single-word utterance types and MLUs relative to spontaneous and imitative occurrence.

/TABLE 1 GOES HERE/

It is clear from Table 1 that both children made extensive use of imitation with respect to their total verbal output for each session. At least 26 percent and up to 50 to 60 percent of their total verbal output in any one session was imitative.

/FIGURE 1 GOES HERE/

Figure 1 plots the proportion of subjects' total utterance types that were imitative over the ten-week period. The figure demonstrates the relative consistency of imitation for Mike and Jeff. Jeff, the more imitative subject of the two, demonstrated slightly more variation than Mike in his relative tendency to imitate with each successive week. Jeff's rate of imitation remained relatively stable until Week VI and rapidly declined thereafter. Mike's extent of imitation was stable from Weeks I-III, systematically increased from IV-VI, and then returned in Weeks VII-X to a level slightly higher than his initial baserate level of imitation. The greatest change from the least to the most imitative output for Jeff was $\pm$ 37 percent and for Mike $\pm$ 26 percent ,respectively of their total verbal output. Bloom et al (1974) report somewhat less variation--about $\pm$ 16 percent over seventeen weeks for language-normal children with MLUs from 1.00 to 2.00 morphemes.

We examined the possibility that subjects' imitations, even though frequent, could be less complex than their own spontaneous utterances. A

Table 1: Summary Description of Speech Samples

Sampling Session	Length (Hours)	Sample Size (Utterances)	Total No. Multi-word Utterance Types	Proportion Utterance Types (All Utterances)			Proportion Distinct Multi-Word Utterance Types			MLU (All Utterances)	
				Spon.	Imit.	Spon. & Imit.	Spon.	Imit.	Spon. & Imit.	Imit.	Spon.
MIKE											
I	1.50	100	68	.63	.33	.01	.66	.34	--	1.79	2.18
II	1.75	110	66	.64	.33	.03	.66	.32	.02	1.71	1.97
III	1.50	103	70	.62	.32	.06	.73	.23	.04	1.69	2.33
IV	1.00	105	74	.66	.44	--	.59	.41	--	1.89	2.20
V	1.25	100	66	.49	.50	.01	.58	.41	.01	1.90	2.14
VI	1.50	100	63	.39	.57	.04	.48	.49	.03	2.05	2.29
VII	1.50	102	68	.65	.31	.04	.75	.24	.01	1.88	2.24
VIII	1.75	105	62	.54	.45	.01	.53	.47	--	1.81	1.82
IX	1.50	100	70	.63	.36	.01	.56	.43	.01	2.22	1.89
X	1.25	99	75	.62	.38	--	.53	.47	--	2.55	1.95
JEFF											
I	1.00	117	47	.36	.57	.07	.49	.51	--	1.58	1.72
II	1.50	180	104	.37	.63	--	.29	.71	--	1.74	1.66
III	1.25	122	53	.39	.57	.04	.34	.62	.04	1.61	1.50
IV	0.75	106	70	.40	.59	.01	.37	.63	--	1.97	1.76
V	1.50	185	63	.49	.51	--	.41	.59	--	1.60	1.43
VI	1.00	179	81	.50	.50	--	.52	.48	--	1.67	1.56
VII	2.00	221	133	.67	.33	--	.72	.28	--	1.77	2.05
VIII	1.00	181	111	.71	.29	--	.71	.29	--	1.92	1.87
IX	1.50	198	128	.68	.32	--	.62	.38	--	2.23	2.11
X	1.50	182	115	.73	.26	.01	.73	.26	.01	2.06	2.11

correlated t-statistic revealed that imitative MLU values were not significantly different from spontaneous MLU values (t=1.25; df=9; p<0..05), thus disconfirming this hypothesis. These data collectively suggested that the relative extent of both subjects' imitations was associated with quantitiative and possibly some qualitiatve changes going on in their grammars. At least there was some certainty that subjects' imitations were not less complex than their self-generated utterances, since their imitative MLUs were at some point in time longer or as long as their spontaneous utterance lengths. Subsequent analysis explored more closely how lexical and grammatical patterns were distributed in subjects' imitative and spontaneous speech.

Lexical Changes

Table 2 displays TTRs, means, and standard deviations calculated on imitative and spontaneous word types (i.e., all uniquely different words) used in subjects' single-word and multi-word utterances. With the exception of word types used singly (t<1.00) by Mike, the trend was for imitative TTR values to significantly exceed spontaneous TTRs (t=3.02 to 4.30; df=9; p<0.05 by two-tailed test). Since there was significantly greater lexical diversity appearing in subjects' imitative productions, the role that imitation could be serving as a strategy for lexical acquisition was explored further.

/TABLE 2 GOES HERE/

In a second and more extensive analysis, the contrastivity of word use from session to session was determined; that is whether a heterogenous population of words existed with some words distributed imitatively, spontaneously or both in each session. All word types from multi-word utterances were separated and entered in this analysis. A requirement for analysis was that each distinct word type be sampled three or more times (tokens) in a given session. The null hypotheses predicted that the

Table 2: Type-Token Ratios for Words Used in Single or in Multi-word Utterances in Subjects' Imitative and Spontaneous Speech

Mike					Jeff				
	Imitative		Spontaneous			Imitative		Spontaneous	
Session	Single Wd.	Multi-wd.	Single wd.	Multi-wd.	Session	Single wd.	Multi-wd.	Single wd.	Multi-wd.
I	1.00	.66	.89	.53	I	.74	.70	.68	.60
II	1.00	.85	.85	.52	II	1.00	.60	.89	.74
III	1.00	.80	1.00	.58	III	1.00	.71	.83	.61
IV	1.00	.77	1.00	.73	IV	.95	.73	.94	.54
V	.96	.73	1.00	.63	V	.97	.86	.76	.73
VI	.92	.80	1.00	.67	VI	.86	.73	.72	.52
VII	.88	.95	1.00	.56	VII	.94	.61	.75	.63
VIII	.89	.76	.96	.67	VIII	.90	.68	.48	.36
IX	1.00	.78	.91	.70	IX	.82	.72	.77	.45
X	1.00	.83	.89	.75	X	1.00	.88	.84	.43
Mean	.97	.79	.95	.63		.92	.72	.77	.56
S. D.	.05	.08	.06	.08		.09	.09	.13	.13

probability of each word type being spontaneous or imitative was the same from word type to word type. A chi-square statistic compared obtained to expected frequency distributions for word types used imitatively and/or spontaneously in each session.[3]

/TABLE 3 GOES HERE/

Table 3 summarizes the number of word types (> 3 tokens) used only imitatively, only spontaneously or both imitatively and spontaneously by each subject and the overall chi-square values for each session. Inspection of this table revealed very few word types used as single-word utterances that recurred with greater than three tokens in each session to be included in this analysis. However, for those word types used by Jeff that did satisfy minimum sampling requirements, only one session (VI) resulted in a heterogenously distributed group of word types (χ=13.00; df=3; $p<0.01$). As Table 3 reveals, three of these words were used exclusively in spontaneous speech and one appeared only imitatively. Results relative to subjects' use of single-word utterances, nonetheless, are inconclusive since small distributional frequences of word types with three tokens or greater constrained the meaningfulness of the statistic used to compare differences in imitative versus spontaneous word use.

Word types appearing in subjects' multi-word utterances, however, were more numerous and statistical analysis revealed that this population was contrastive. The null hypothesis was rejected in nine out of ten sessions for Jeff (I-IX), and in eight out of ten sessions for Mike (I, III-VI, VIII-X; see Table 3). Since there was clearly evidence for two populations of words, the contribution of each word type to this overall effect was examined next. It was important to determine whether a small subset of the total word types in each session could account for the heterogenity of word use. Such an outcome would indicate an imitative strategy that was selective to a small proportion

Table 3: Frequency, Overall χ and Probability Values for Distribution of Word Types Used Imitatively and/or Spontaneously in Each Session ($\geq$ 3 Tokens).

MIKE

Session	I	II	III	IV	V	VI	VII	VIII	IX	X
Single-Word Utterances										
Imitative only	0	0	0	1	0	0	0	0	1	1
Spontaneous only	0	2	0	0	0	0	0	0	0	0
Both	0	0	0	0	0	0	0	0	1	1
Multi-Word Utterances										
Imitative only	1	0	1	1	1	1	0	4	1	2
Spontaneous only	13	8	3	4	4	2	11	2	3	4
Both	9	7	12	10	14	10	5	2	10	6
χ										
Single-Word Utterances	-	-	-	-	-	-	-	-	-	-
Multi-Word Utterances	54.22[c]	19.2	24.95[a]	32.22[b]	30.21[a]	22.73[a]	22.5	23.19[c]	22.29[a]	31.53[c]

[a] $P < 0.05$ [b] $P < 0.01$ [c] $P < 0.001$

Table 3 (Cont.): Frequency, Overall χ and Probability Values for Distribution of Word Types Used Imitatively and/or Spontaneously in Each Session ($\geq$ 3 Tokens).

JEFF

Session	I	II	III	IV	V	VI	VII	VIII	IX	X
Single-Word Utterances										
Imitative only	0	0	0	0	0	1	0	0	0	0
Spontaneous only	0	0	0	0	5	3	3	2	2	2
Both	6	0	2	0	2	0	0	1	1	0
Multi-Word Utterances										
Imitative only	1	6	4	6	1	1	3	1	2	0
Spontaneous only	0	3	0	1	2	5	13	9	12	9
Both	10	13	8	11	3	7	17	14	20	18
χ										
Single-Word Utterances	3.33	-	0.0	-	5.87	13.00[b]	-	2.55	2.25	-
Multi-word Utterances	25.62[b]	55.61[c]	20.69[a]	42.2[c]	14.79[a]	25.63[b]	98.91[c]	59.05[c]	72.18[c]	32.59

[a] $P < 0.05$ [b] $P < 0.01$ [c] $P < 0.0001$

of word types in the child's total lexicon at given sampling periods.

A second chi-square statistic examined the probability that the imitative frequency of a word type (used in multi-word constructions) exceeded its spontaneous frequency and vice versa relative to the imitative to spontaneous distribution of all remaining word types in each session.[4] Expected frequencies were computed with the contribution of a given word's frequency of occurrence subtracted from row and column frequency totals. This procedure resulted in expected cell frequencies that were not spuriously high, thus inflating the value of the statistic used to reject the null hypothesis.

/TABLE 4 GOES HERE/

Table 4 summarizes the number of cases in which a given word type ($\geq$ 3 tokens) significantly deviated from the imitative to spontaneous distribution of all remaining word types in each session. Statistical outcomes confirmed that the number of word types that significantly contributed to the heterogenity of word use was relatively small, but typically exceeded ten percent of the total population of word types ($\geq$ 3 tokens) in any given session. These word types, could thus be characterized as 'extremely split' relative to the overall imitative to spontaneous disbribution of remaining word types in each session. Table 4 also indicates the direction that these words were split relative to their spontaneous and imitative occurrence. Data for Mike revealed more word types that were predominantly imitative than spontaneous in the first four weeks of the study. For Jeff, more extensive imitation of selected word types occurred in the final four sessions of the study. This pattern was in contrast to subjects' overall propensity to imitate multi-word utterances throughout the ten weeks (see Table 1). As Table 1 confirms, Mike's most extensive use of imitation for multi-word constructions occurred during the midpoint and near the end of the study at Weeks IV-VI and again, at VIII-X. Jeff, on the other hand, showed an

Table 4: Summary of word types that deviated significantly ($P < 0.05$) from the distribution of remaining word types in a session for multi-word utterances only.

Subject	Session	No. Word Types with Significant Deviations	No. Word Types in Analysis	Proportion of All Word Types	No. Word Types Predominantly Imitative: Predominantly Spontaneous
MIKE	I	3	23	.13	3:0
	II	2	15	.13	1:0
	III	2	16	.13	2:0
	IV	3	15	.20	3:0
	V	3	19	.16	2:1
	VI	4	13	.31	2:2
	VII	1	16	.06	1:0
	VIII	3	8	.38	1:2
	IX	4	14	.29	2:2
	X	4	12	.33	3:1
JEFF					
	I	3	11	.27	1:2
	II	2	22	.09	0:2
	III	2	12	.17	0:2
	IV	2	18	.11	0:2
	V	2	6	.00	1:1
	VI	2	13	.15	1:1
	VII	8	33	.24	7:1
	VIII	4	24	.17	3:1
	IX	5	34	.15	4:1
	X	3	27	.11	2:1

inclination to imitate most extensively up to Week VI, with rapid decline thereafter.

Hence, there was not only evidence supporting the case that imitation--as a strategy for lexical acquisition--was selective only to a limited set of unique word types appearing in subjects' lexicons at given sampling periods, but also that such lexical differentiation took precedence over any other relative tendency on the part of these two children to imitate at given periods throughout the study.

Even though a strategy for lexical differentiation was influencing which word types at any given week would be selectively imitated by the children, and which ones would not, it could not resolve whether imitation over the long haul could assist spontaneous acquisition of lexical forms. In order to statistically test the hypothesis that a significant proportion of words would progress from mostly imitative to mostly spontaneous use, Spearman rho correlations were computed for each word type that (1) was sampled a grand total of at least three times or more throughout the ten weeks, (2) occurred spontaneously and imitatively over at least two sessions, and (3) showed some change over time, either from imitative to spontaneous use, or vice versa.

Following Bloom et al.'s procedures (1974), ranks were assigned to each word type (1) relative to the number of sessions the word re-occurred in, and (2) for the observed ratio of imitative to total occurrences of the word in a given session. This procdure was applied separately for word types appearing in single-word versus multi-word utterances. A two-tailed t-test was applied to the mean of all individual rho values with the null hypothesis for the value of rho set at 0.00. There were 354 tests on word types that varied in session use from 2 to 10 sessions for both subjects.

Results of this analysis indicated for Jeff a significant tendency for imitative word types to decrese over time while increasing in spontaneous use

in single-word utterances (mean rho=0.38; $t(60)=5.54$; $p<0.0001$), and in multi-word utterances (mean rho=0.27; $t(155)=6.31$; $p<0.0001$). This same relationship held for word types used as single-word utterances in Mike's speech (mean rho=0.25; $t(27)=2.14$; $p<0.04$), but not in his multi-word constructions (mean rho=0.01; $t(128)=1.00$; $p>.87$). These results confirmed for Jeff that imitation was serving a lexically progressive function, both for words practiced as single word utterances and in syntactic productions. For Mike, imitation as a strategy for introducing lexical items to spontaneous speech was specific only to words practiced in single-word contexts.

In summary, thusfar, there was evidence that subjects' imitations of multi-word utterances on a weekly basis were selective to a small set of word types which accounted, in turn, for the increased lexical diversity in their imitative repertoires. Such a strategy for lexical selectivity occurred independently of subjects' propensity to imitate multi-word utterances across successive weeks of the study. There was additional confirmation that imitation was not only selective, but also that it served a lexically progressive function in that words that were predominantly imitative in earlier weeks of the study became predominantly spontaneous.

It was possible in Jeff's case that the imitative to spontaneous shift of word types in multi-word utterances was attributable to a focus on learning new grammatical forms in addition to the acquisition of novel lexical forms. Hence, further changes in both children's use of a variety of semantic-syntactic relations was the subsequent focus of study.

Semantic-Syntactic Changes

All distinctly different multi-word utterances (types) were assigned to one of 14 semantic-syntactic categories similar to taxonomies adopted by Brown (1973) and Bloom et al. (1974) for coding relational utterances in Stage I speech (se Appendix). Imitative and spontaneous utterance types within each

category were compared within and across successive sessions. Utterance types with both imitative and spontaneous tokens represented less than four percent of all multi-word utterances (see Table 1), and did not encode any new semantic-syntactic categories. Consequently, they were excluded in this analysis. Futhermore, only those categories considered 'productive' (i.e., represented by at least four distinct utterance types per session) were analyzed in each weekly session.

All 14 relations were sampled in both boys' speech throughout the duration of the study, though not all categories were represented in every weekly session. Those categries sampled in less than five sessions for Mike included: agent + object and non-existence, and for Jeff: recurrence, non-existence, and rejection/denial. All other relations were sampled at least once in at least six of the ten sessions (see Table 6). The 14 categories accounted for .84 of Mike's and for .87 of Jeff's total multi-term utterance types.

Several categories were 'noncontrastive' in that they occurred only spontaneously, only imitatively, or occurred both imitatively and spontaneously with less than four tokens in a majority of sessions. These included the following for both children: agent + object, place + object of locative action, state + location of object, recurrence, non-existence, rejection/denial, notice, and Wh-questions (see Table 6). Additionally for Jeff, possession was not contrastive, nor was the agent + action + object category for Mike.

/TABLE 5 GOES HERE/

Table 5 summarizes the frequency of imitative and spontaneous utterance types for all 14 categories. Attribution was the most frequently encoded category for both subjects followed by action + object. Other categories in order of frequency for Mike, included: possession, existence and agent +

action. For Jeff, the respective order was: agent + action, existence and agent + action + object, (the only three-word relational category that was productive in his speech). This latter category accounted for 25 of Mike's total multi-word types, but it occurred almost exclusively in spontaneous speech and, therefore, was non-contrastive.

Expected frequencies for a given category were generated from the distribution of imitative to spontaneous occurrences of all remaining categories considered contrastive in any given session.[5] These values are plotted as dashed lines and compared descriptively to observed frequencies for each category in Figures 2-7. Subcategories for those semantic-syntactic relations that were lexically distinct are also listed. For example, the possession category was encoded by Mike with the possessive pronoun my and also by other general nominatives.

/FIGURE 2 GOES HERE/

Figure 2 illustrates changes over time in use of the attribution category (adjective + noun), which declined in imitative frequency over successive weeks in both subjects' speech. For Mike, however, greater imitative use of the category relative to spontaneous use from Weeks I-IV, VI, and Week VIII was inversely related to the expected relationship given the spontaneous to imitative proportion of other contrastive categories during these periods (see Table 5). By session X, spontaneous use slightly exceeded both observed and expected imitative use of the category; however, this shift was insufficient to indicate whether imitation had given way to predominantly spontaneous and productive control of the attribution category.

More convincing evidence in support of this effect is illustrated in Figure 2 for Jeff, whose spontaneous to imitative use of the attribution relation matched the expected direction of distributional imitative/spontaneous frequencies in his multi-word speech from I-VI. By VII,

when Jeff's spontaneous output exceeded imitative output, this relationship was reversed and by X, spontaneous control of this relational category surpassed his imitative use by a 2:1 ratio in the expected direction, suggesting that prior imitative practice had played a role in assisting acquisition of this category.

/FIGURE 3 GOES HERE/

Figure 3 illustrates both subjects' use of the semantic-syntactic category, existence, which was encoded by two lexically distinct forms: [∃] + noun and demonstrative pronoun (e.g., this , that) + noun. Mike's use of the former lexical subcategory was contrastive only during Weeks V and IX-X; greater imitation of the category exceeded the expected ratio given greater spontaneous productions of other contrastive categories at V and IX, but there was no evidence by X that Mike had acquired spontaneous control of this category.

Jeff did not encode the [∃] + noun relation contrastively until the final session. However, demonstrative + noun forms were contrastive in VII, IX and X. The observed to expected ratios of imitative/spontaneous occurrences of this category were inversely related in Week VII when the proportional use of imitation was less than Jeff's spontaneous output. By the final two weeks of the study, this relationship was reversed such that spontaneous use slightly exceeded imitative use of the category in line with what was predicted.

/FIGURE 4 GOES HERE/

Figure 4 illustrates two lexical subcategories, action + pronominal object and action + nominative object, for the more general action + object category. The action + nominative object subcategory was contrastive for all but two sessions (V and VIII) for Mike. Unlike the attribution relation, Mike's more frequent spontaneous encoding of this subcategory from I-III and

VI-VIII was congruent with expected ratios. Increased imitative use of this category relative to spontaneous use by X was also consistent with his proportional imitative increase for other categories in this final week (see Table 6). These data suggest that this particular lexical subcategory was initially productive in Mike's spontaneous repertoire. Later increased imitative use (IX-X) was explained by the introduction of new lexical items used to encode this relation. A distincly different set of verbs appeared in these final two sessions for encoding the action term in this category.

In keeping with Jeff's prior pattern for the attribution relation, a sudden imitative to spontaneous shift in use of the action + nominative object sucategory occurred at VI. Thereafter, spontaneous use exceeded imitative production of the category, with the exception of Week IX when proportional use of imitation and spontaneous utterance types for other contrastive categories was approximately even.

/FIGURE 5 GOES HERE/

Both subjects used the agent + action relation less frequently than action + object. However, the former was contrastive for Mike from VI-X. Like his previous pattern with the action + nominative object category, Mike's observed spontaneous encoding of this relation exceeded his imitative use until IX and X. Once again, a set of uniquely different verbs used to encode the action term in this category at IX and X relative to prior weeks, accounted for this shift.

Jeff's use of agent + action was contrastive throughout all ten weeks. Unlike his prior use of the action + nominative object category,, Jeff's tendency was to use agent + action more spontaneously than imitatively even in initial weeks of the study, when expected imitative ratios for other contrastive categories exceeded spontaneous use. By VII-X, there was clearly a preference for spontaneous encoding of this relation.

TABLE 5

TOTAL NUMBER OF UTTERANCE TYPES IN EACH SEMANTIC-SYNTACTIC CATEGORY - MIKE

	SESSION	I		II		III		IV		V		VI		VII		VIII		IX		X		
		Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Total
*	Attribution	4	14	4	12	2	7	5	15	6	6	4	9	4	1	7	9	7	6	8	6	136
*	Existence	5	1	1	1	5	1	-	4	5	6	2	2	2	-	2	1	4	6	1	5	54
*	Possession	2	1	4	-	5	2	8	2	10	1	7	4	7	1	7	6	6	-	6	-	79
*	Agent-action	4	1	4	-	1	-	2	-	1	1	4	2	5	2	3	1	1	3	2	3	40
*	Action-object	8	1	8	2	13	5	2	3	3	1	8	5	8	3	5	-	7	6	3	9	100
	Agent-object	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Agent+action-object	2	-	2	-	5	-	8	-	2	-	-	-	3	-	-	-	1	-	1	1	25
	State+location of object	2	-	1	1	3	1	2	2	1	-	-	3	1	2	-	2	-	1	1	2	25
	Place+object of location	2	1	5	2	2	-	3	-	1	1	2	-	1	3	-	1	3	-	1	2	30
	Recurrence	1	-	5	1	1	1	2	1	1	-	1	-	2	1	2	-	2	-	2	-	21
	Nonexistence	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	3
	Rejection/ Denial	1	-	1	-	-	1	-	1	-	1	-	3	1	-	-	1	-	-	-	-	10
	Notice	-	-	-	1	2	-	2	-	-	-	-	-	3	-	1	1	-	-	1	-	11
	Wh-question	13	-	2	-	6	-	2	-	2	1	2	-	3	-	2	1	5	-	1	-	40

* indicates category was 'productive'

TABLE 5 (Cont.)
TOTAL NUMBER OF UTTERANCE TYPES IN EACH SEMANTIC-SYNTACTIC CATEGORY - JEFF

	SESSION	I		II		III		IV		V		VI		VII		VIII		IX		X		
		Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Sp	Im	Total
*	Attribution	9	18	6	41	12	28	6	15	5	11	12	23	37	16	25	19	11	20	37	18	369
*	Existence	-	-	2	1	-	-	-	6	-	4	1	3	4	4	2	2	3	8	6	2	48
	Possession	1	2	2	3	1	-	-	-	-	1	3	-	7	-	5	-	1	1	3	1	31
*	Agent-action	3	2	4	1	2	-	5	3	2	4	2	3	11	3	15	1	12	-	12	1	86
*	Action-object	2	1	2	11	1	1	2	3	2	10	8	1	10	6	4	2	11	10	4	2	93
*	Agent-object	-	3	2	-	1	1	1	2	1	2	-	-	4	2	4	-	1	-	3	-	27
*	Agent+action-object	1	1	-	-	-	-	-	2	-	1	3	-	9	2	5	1	7	-	7	4	43
	State+location of object	-	2	-	-	1	-	-	2	-	1	-	1	4	-	2	1	8	-	2	3	27
	Place+object of location	-	-	-	4	-	-	-	-	-	1	-	2	-	1	3	2	3	2	2	-	20
	Recurrence	-	1	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1	1	-	-	6
	Nonexistence	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Rejection/ Denial	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	5	1	3	1	12
	Notice	-	-	-	1	-	1	2	2	-	-	1	-	-	1	-	-	1	-	-	-	9
	Wh-question	-	-	1	-	-	1	1	-	1	-	-	-	-	-	1	-	4	-	7	-	16

* indicates category was 'productive'

/FIGURE 6 GOES HERE/

This trend coincided with Jeff's contrastive use of the agent + action + object relation during VII-X (see Figure 6). It is likely that Jeff's earlier imitative control of the action + nominative object relation and his later spontaneous control of the agent + action relation played a role in assisting the compounding of these two-term relations into a single and more complex categorical rule expressing all three semantic notions. Brown (1973) describes the compounding of semantic relations in this way as simple 'concatenation with deletion'. He suggests further that a principle of 'cumulative complexity' predicts the child's ability to use the component two-term relations from his/her use of the combinatorial product (in this case, the agent + action + object relation). Yet the converse is not true; that is, the child's use of the components "do not gurarantee the composition" (1973; p. 186). This prediction was upheld in Jeff's case, since frequent and spontaneous use of agent + action + object did not appear, at least until the agent + action and action + nominative object relations were established spontaneously by Week VII (compare Figures 4-6).

Figure 7 plots Mike's use of the possession relation. Only the pronominal form, my in combination with a nominal occurred contrastively from III-VIII. Other lexical subcategories of this relation that included names for people or animates were sampled rarely in Mike's speech (see Figure 7).

/FIGURE 7 GOES HERE/

The observed and expected ratios for encoding this relation more spontaneously than imitatively occurred in the predicted direction. However, at IX and X, when proportional imitative use of other contrastive categories matched or exceeded Mike's spontaneous multi-word productions, the my + noun subcategory occurred only spontaneously. To the extent that spontaneous use is an index of productive rule knowledge, prior imitation in III-VIII of this

category provides some evidence that productive use of this relational rule unfolded somewhat gradually.

DISCUSSION

Initial results of this study confirmed that Mike and Jeff made fairly extensive use of imitation over the ten-week period. Bloom et al. (1974) have reported that proportional imitative output for their most imitative Stage I subject, Peter, ranged from 7 to 42 percent over approximately 15 weeks as MLU approached 2.0 morphemes. Mike and Jeff's imitative output, in comparison, ranged from at least 26 percent up to 57 and 63 percent of their total verbal output, respectively, at a comparable MLU. Coggins and Morrison (1981) and Ramer (1976), however, observed much less use of imitation in the speech of Down's and language-normals respectively. Differences across studies possibly suggest individual differences in language-learning strategies employed by children as they approach the word-combining stage.

Bloom et al. also observed that the tendency to imitate at greater than 15 percent of total output remained fairly consistent for four of their language-normal children when MLUs were between 1.0-2.0 morphemes. Our results did not conform to this observation entirely; on the contrary, subjects displayed markedly different patterns relative to each other in their inclination to imitative consistently over time. Jeff's imitation was initially more extensive than his spontaneous output and subsequently declined in successive weeks. It appeared that this developmental shift from primarily imitative to spontaneous output was related to systematic changes going on in his lexicon and grammar.

Results statistically confirmed that imitation was selective to a small subset of words used in Jeff's multi-word utterances. Furthermore, words used both singly and in multi-term constructions underwent a progressive shift over time from predominanty imitative to spontaneous use. Five of 14

semantic-syntactic relations that were contrastive and were sampled with sufficient frequency at given sampling periods, underwent developmental change in Jeff's grammar,including: agent + action, action + nominative object agent + action + object, attribution and demonstrative + noun relations. For the first four of these categories, as imitation declined, there was an increasing tendency over successive weeks for the categories to appear predominantly in spontaneous speech in keeping with Jeff's overall imitative propensity.

Although Mike imitated as extensively as Jeff, Mike's tendency was to imitate consistently over time, but less frequently than he spontaneously produced. There was a systematic increase in Mike's imitation so that it equalled or exceeded spontaneous output about midway through the study, thereafter imitation declined but stabilized slightly above his initial rates. This pattern corresponded with lexical changes for Mike, though changes were less systematic than they were for Jeff. Mike also made use of a lexically selective strategy for words used imitatively in multi-word utterances, and this coincided with significantly greater lexical diversity (TTRs) in his imitative compared to spontaneous multi-word constructions. However, the only shift in imitative to spontaneous word use over successive weeks, occurred for word types appearing in Mike's single-word, and not multi-word, utterances. Further examination of grammatical changes over time in Mike's speech revealed that imitation was not consistently at the leading edge of his spontaneous grammar. At the outset of the study, Mike displayed greater spontaneous than imitative use of three of five contrastive categories (action + nominative object, agent + action and possession). His increased imitation of the first two categories in the final two weeks of the study reflected a pattern of introducing a set of novel action words to the categories. Likewise, data for the remaining two contrastive categories (attribution and [ə] + noun

subcategory for existence), did not conclusively indicate whether imitation gave way to more spontaneous and productive control of these categories in Mike's grammar.

In summary, although both children imitated in a lexically selective fashion, results suggested that their imitations assisted their linguistic development in fairly different ways. Over time, imitation served to introduce a new lexicon to Jeff's spontaneous single- and multi-word productions, and also assisted productivity of a few categorical rules in his spontaneous grammar. In contrast, Mike's imitative repertoire was lexically progressive only for words used as single-word utterances. Consequently, there was little remaining evidence that his imitation of five contrastive multi-word semantic-syntactic relationships assisted spontaneous control of the forms. Instead, from the outset, Mike demonstrated spontaneous use of three of five categorical rules in his speech. When he did imitate them more frequently than he spontaneously produced, it served a means of introducing new lexical forms into old combinatorial patterns.

Beyond individual differences in imitative strategies, language sampling contexts which differed for both boys may have contributed to differences in their imitative styles. Prior literature has not examined the stability of imitation for given children as a function of home versus clinic/school environments. This issue is being explored further in a follow-up to the present study.

Evidently, though imitation has been identified as one of several language-learning strategies, explanations about why children imitate are still unresolved in the literature. On one extreme, are studies advocating that imitation initially functions as a rote-like process and reflects little about what children fully analyze about the adult grammar (Clark, 1974; 1978; Fraser, Bellugi & Brown, 1963). Alternate interpretations have been that

imitation reflects active processing of linguisitic information for children (Bloom et al., 1974; Slobin & Welsh, 1973) used either for introducing and consolidating new linguistic forms to their spontaneous repertories, or for exerting active control over the communicative environment (Bloom et al., 1976; Folger & Chapman, 1978; Gallagher & Craig, 1984; Keenan, 1975; Ramer, 1976; Scherer & Olswang, 1984; Seitz & Stewart, 1975).

Although further studies comparing imitative strategies of language-impaired children need to be conducted to substantiate the function of imitation in delayed speech, results from the present study indicate that some spontaneous imitations may be at the leading edge of lexical and/or grammatical change for these children, as it appears to be for language-normal children (Bloom et al., 1974; Ramer, 1976; Moerk, 1977). Moreover, evidence thus far collectively demonstrates the clinical value of utilizing long-term records of the child's spontaneous imitations as a means of predicting recently-acquired structures or new acquisitions to their spontaneous speech. Equipped with this type of information, the practitioner is certainly in a better position to make principled decisions for language training with the communicatively impaired child.

FOOTNOTES

1. Original attempts to sample Jeff's speech in his preschool environment were unsuccessful since he rarely verbalized spontaneously in this setting. Weekly sampling in the home provided a sufficiently large enough corpus and appeared to be more representative of his verbal output.

2. A majority of these were identical to relations previously defined by Bloom et al. (1974) including place and object-of-locative action, state-location-of-object, attribution, existence, possession, recurrence, nonexistence and notice. Additional categories borrowed from Brown (1973) were necessary to account for other productive multi-word relations (rejection, denial, wh-questions, agent-action-object) in subjects' speech, or to more precisely account for semantic distinctions of Bloom et al's more general action-on-affected object category; these included agent-action, action-object, and agent-object two-word relations.

3. Bloom et al. (1974) used an expansion of the binomial to develop expected values for the distribution of word types used imitatively and/or spontaneously based on the imitative proportion of word tokens in each session. A second binomial test ascertained the probability of obtaining the number of word types with 'extreme splits' between imitative and spontaneous use in a session.

4. This procedure was recommended by Wm. J. Conover (personal communication).

5. This procedure was identical to the one used by Bloom et al. (1974).

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APPENDIX

Taxonomy used for coding 14 semantic-syntactic relations in subjects' multi-word utterances

I. Relations specifying movement (actual or implied) on an object. (These were further subdivided relative to explicit reference made to either the agent of the action and/or to the affected object of the action).

* 1. Agent-action: agents were defined as either animate or inanimate instigators of action; inanimate instigators were perceived to have their own motivating force and to cause the action or process specified by the verb in the utterance. Actions entailed perceived movements like "go", "walk", "write".

* 2. Action-object: objects were defined as animate or inanimates undergoing a change of state or receiving the force of the action specified by the verb in the utterance (such as "bake cake", "ride bike"). Objects could be designated either with pro-forms "it" and "that" or nominative forms.

* 3. Agent-object: agents and objects were defined identically with those in (1) and (2) above; the action term was not specified in the utterance but there was an implied action relationship between the agent and object as in "Mommy lawnmower" for a more fully expanded grammatical uttterance "Mommy is pushing the lawnmower".

\+ 4. Place and object-of-locative action: these utterances made reference to movements that affected an object by changing its location. Locative actions (e.g.,"put", "sit") always involved a mentioned or implied agent of-locative action. In some cases, the agent and affected object were the same person as in "Jeff sit down".

* 5. Agent-action-object: utterances that combined previously defined relations (1) and (2).

II. Relations with no actual or implied movement specified

\+ 6. State-location of object: utterances made reference to the location of an object in events in which there was no movement that caused the object to change location as in 'sit chair' or 'baby lie down' (with no movement) (Bloom et al., 1974; p. 395).

\+ 7. Attribution: utterances that made reference to the inherent state of an object (e.g., "sharp", "broke"), some property of the object such as color, size, function or to quantity usually with the words "one" or "two".

\+ 8. Existence: identical to Brown's (1973) nomination category; these utterances merely named or made reference to the existence of an object signalled pre-nominally by the articles "a", "the" or demonstratives "this", "that", etc.

\+ 9. Possession: utterances that specified the typically animate possessors of either alienable or inalienable objects posssessed such

as "Mommy cup", "doggy tail". Alternately, the relation could be specified by the pronoun my and an object name.

+10. Recurrence: utterances made reference to the reappearance of an object, or another instance of an object or event with or without the original object/event still present with lexical forms such as "more" or "another" (Bloom et al., 1974; p. 397).

+ 11. Nonexistence: utterances that specified the disappearance of an object or the nonexistence of the object in a context in which its existence might somehow be expected and included terms such as "no", "no more", "allgone", etc. (Bloom et al., 1974; p. 396).

+12. Notice: utterances that included an ostensive verb such as "see" or "look" in calling attention to an object, or the form "hi" as in "Hi spoon".

+13. Rejection/Denial: utterances such as "no cookie" implying denial of having a cookie, or the forms "no", "don't", "stop", designating rejection of a proffered object or event.

*14. Wh-question: included utterances containing "who", "what", "where", "why" and "how".

* Adapted from Brown (1973); the first three relations collectively designate a more general category defined by Bloom et al. (1974) as Action on-affected object

+ Adapted from Bloom et al. (1974); pp. 395-397.

FIGURE LEGEND

Figure 1 - Proportion of total utterance types imitated as a function of session.

Figure 2 - Number of different imitative (solid bar) and spontaneous (open bar) syntactic types representing the attribution relation for Mike and Jeff.

Figure 3 - Number of imitative (solid bar) and spontaneous (open bar) syntactic types representing /ə / + noun and demonstrative (Dem) + noun subcategories for the relation encoding Existence by Mike and Jeff. (Sessions not represented indicate the relation was not sampled productively).

Figure 4 - Number of imitative (solid bar) and spontaneous (open bar) syntactic types representing pronominal (Pn) and nominal (Nm) forms of the action-object relation for Mike and Jeff. (Sessions not represented indicate that the relation was not sampled productively).

Figure 5 - Number of imitative (solid bar) and spontaneous (open bar) syntactic types representing the agent-action relation for Mike and Jeff. (Sessions not represented indicate the relation was not sampled productively).

Figure 6 - Number of imitative (solid bar) and spontaneous (open bar) syntactic types representing the agent-action-object relation for Jeff.

Figure 7 - Number of imitative (solid bar) and spontaneous (open bar) syntactic types representing lexical subcategories of the possession relation for Mike. (Sessions not represented indicate the relation was not sampled productively).

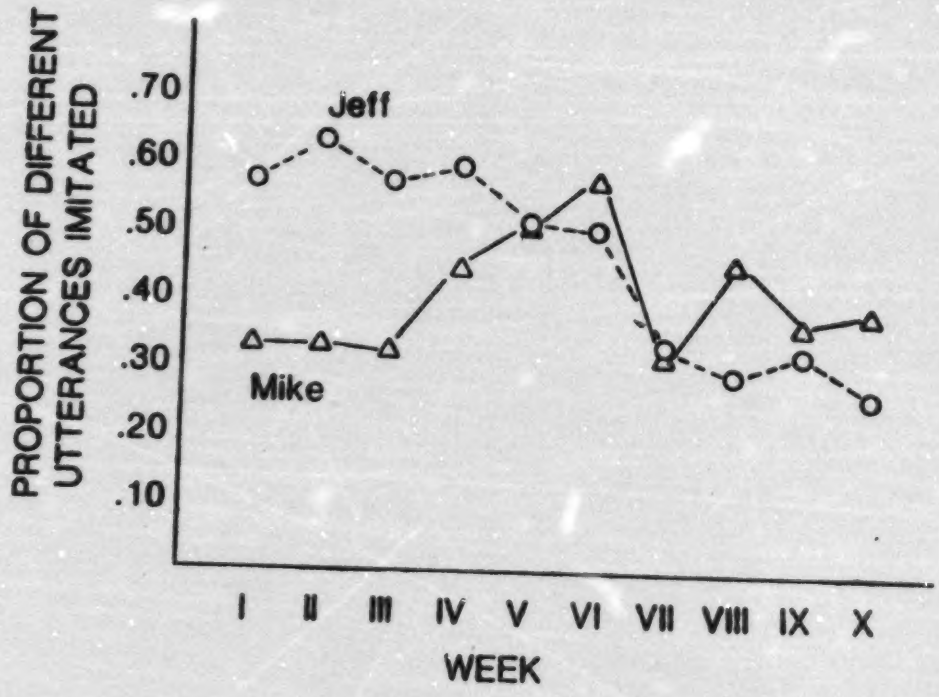

PROPORTION OF DIFFERENT UTTERANCES IMITATED
.70
.60
.50
.40
.30
.20
.10
Jeff
Mike
I
II
III
IV
V
VI
VII
VIII
IX
X
WEEK

FIG. 1

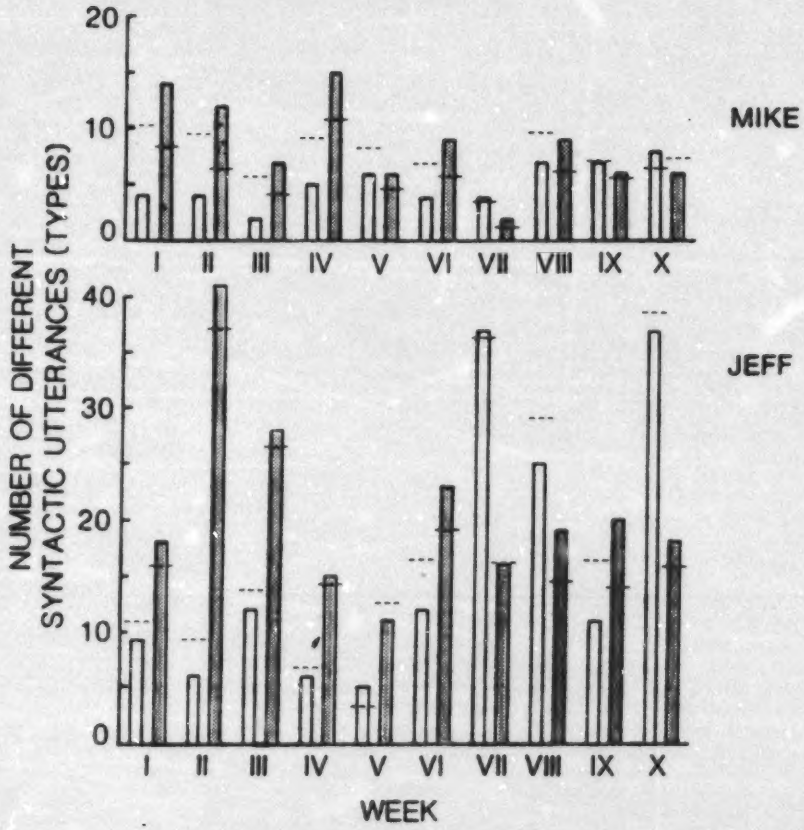

20
10
0
I II III IV V VI VII VIII IX X
MIKE
40
30
20
10
0
I II III IV V VI VII VIII IX X
JEFF
NUMBER OF DIFFERENT SYNTACTIC UTTERANCES (TYPES)
WEEK

FIG. 2

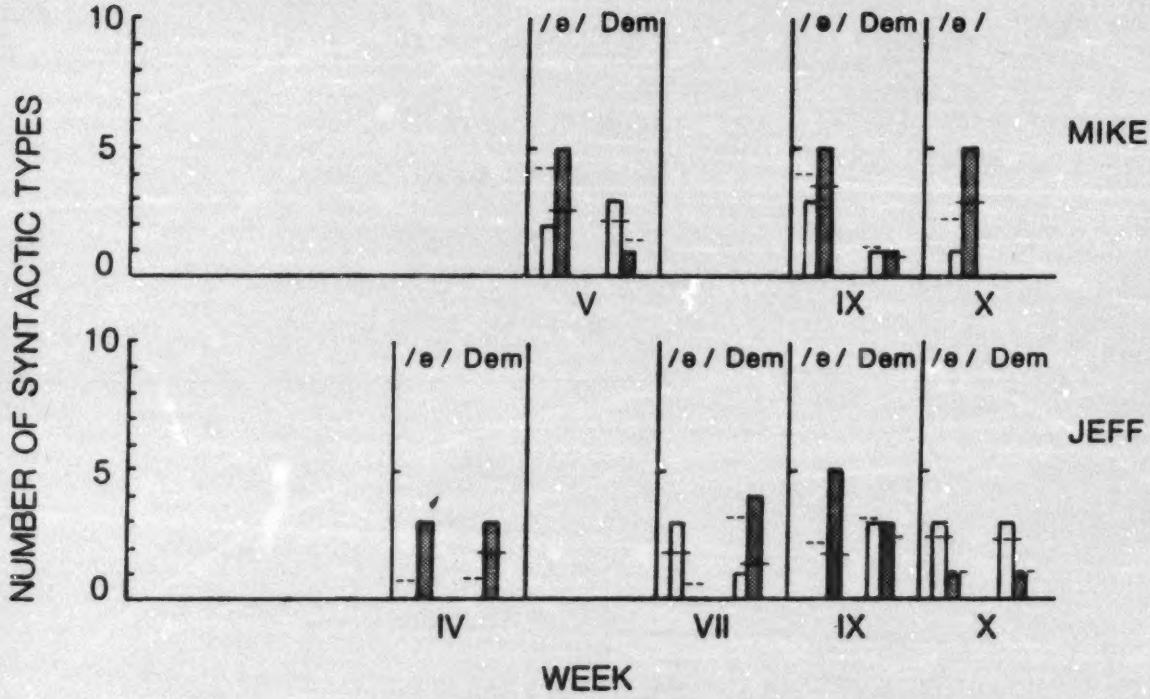

NUMBER OF SYNTACTIC TYPES
10
5
0
/e/ Dem
/e/ Dem
/e/
MIKE
V
IX
X
10
5
0
/e/ Dem
/e/ Dem
/e/ Dem
/e/ Dem
JEFF
IV
VII
IX
X
WEEK

FIG. 3

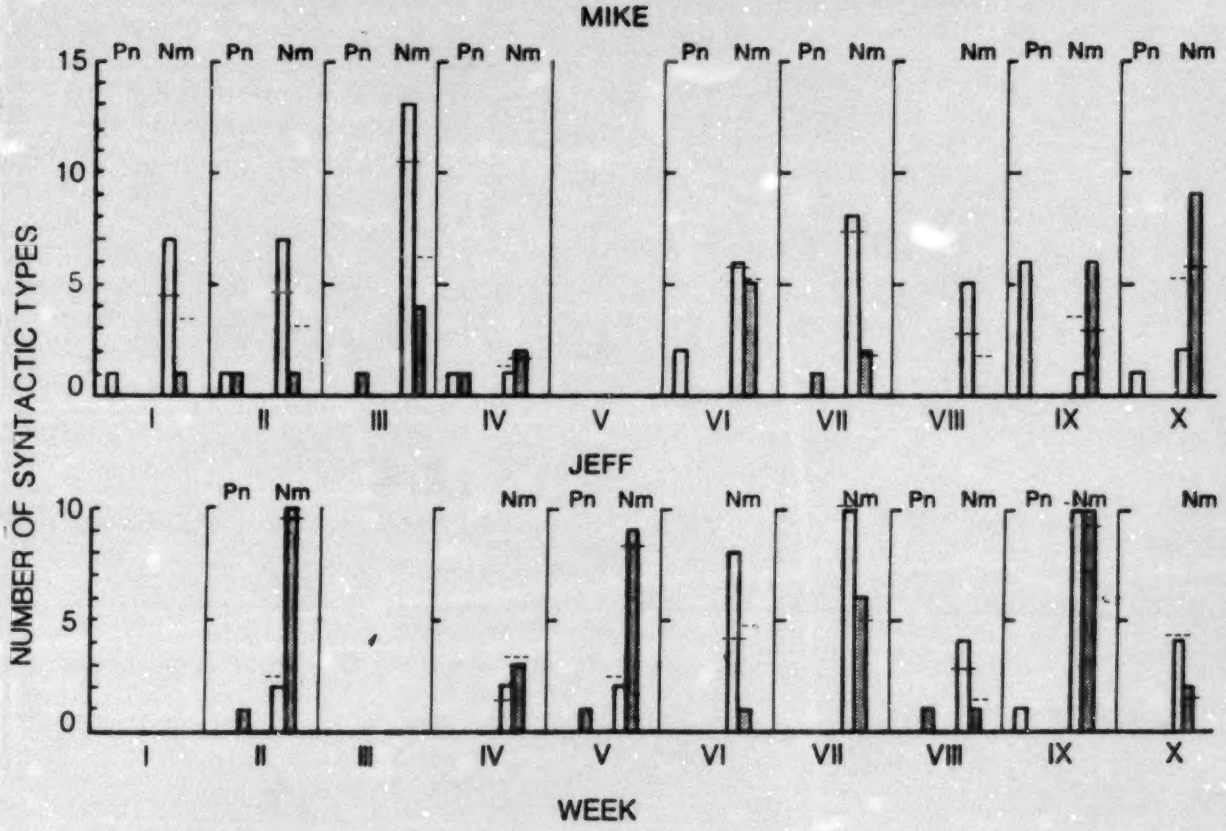

MIKE
Pn Nm Pn Nm Pn Nm Pn Nm Pn Nm Pn Nm Nm Pn Nm Pn Nm
15
10
5
0
I II III IV V VI VII VIII IX X
JEFF
Pn Nm Nm Pn Nm Nm Nm Pn Nm Pn Nm Nm
10
5
0
I II III IV V VI VII VIII IX X
NUMBER OF SYNTACTIC TYPES
WEEK

FIG. 4

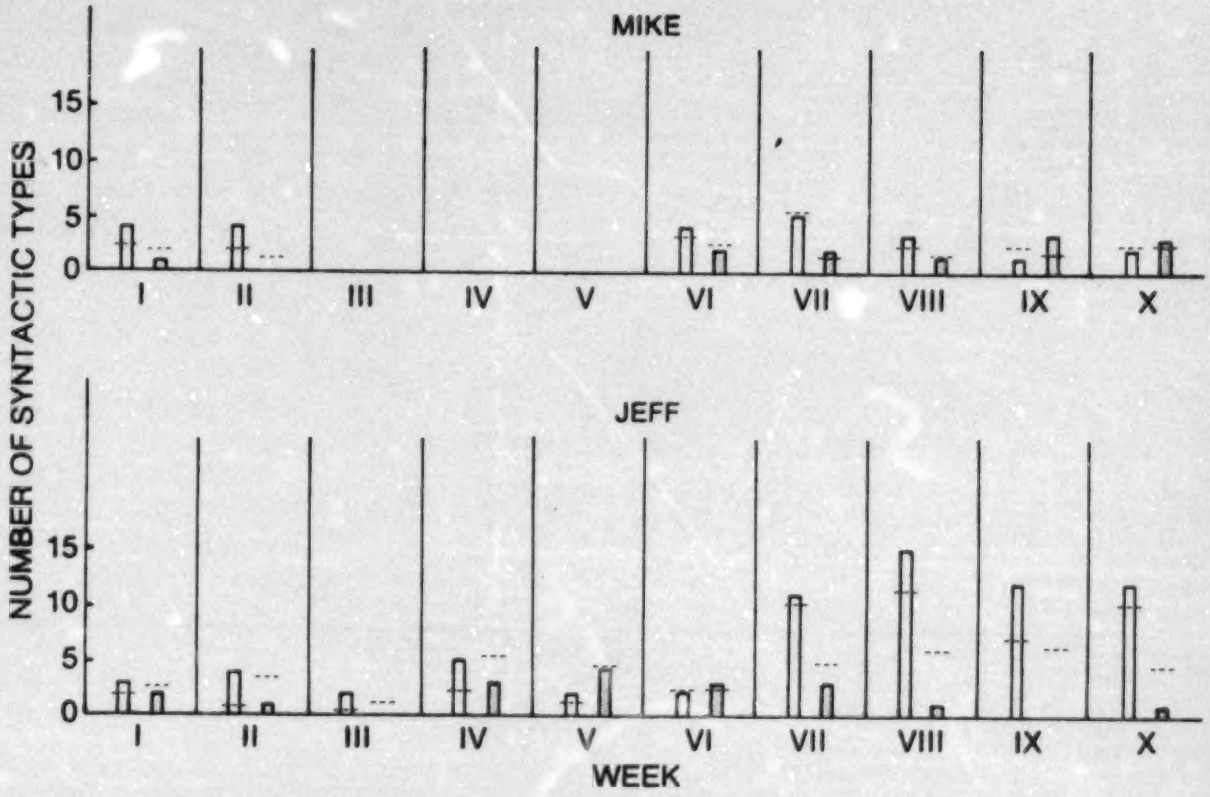

MIKE
JEFF
NUMBER OF SYNTACTIC TYPES
15
10
5
0
I
II
III
IV
V
VI
VII
VIII
IX
X
WEEK

FIG. 5

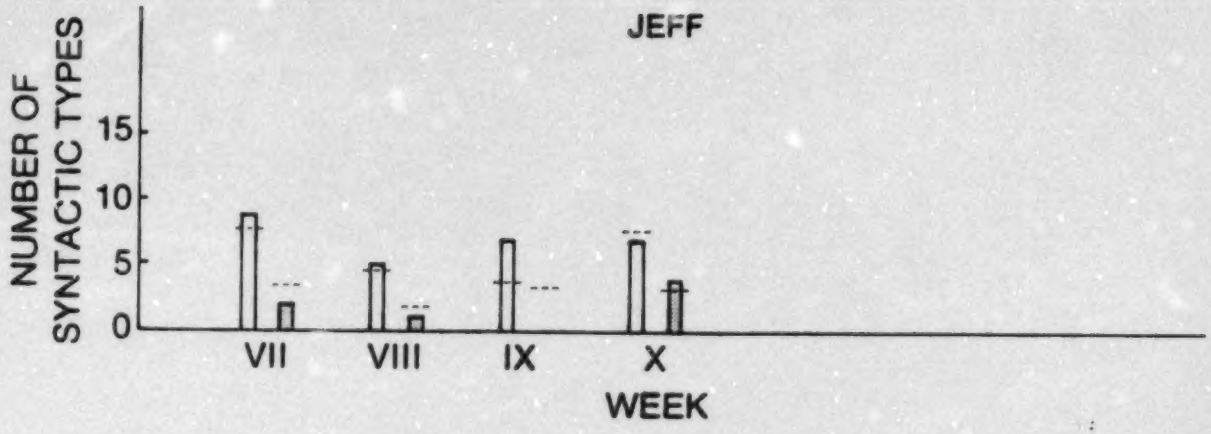
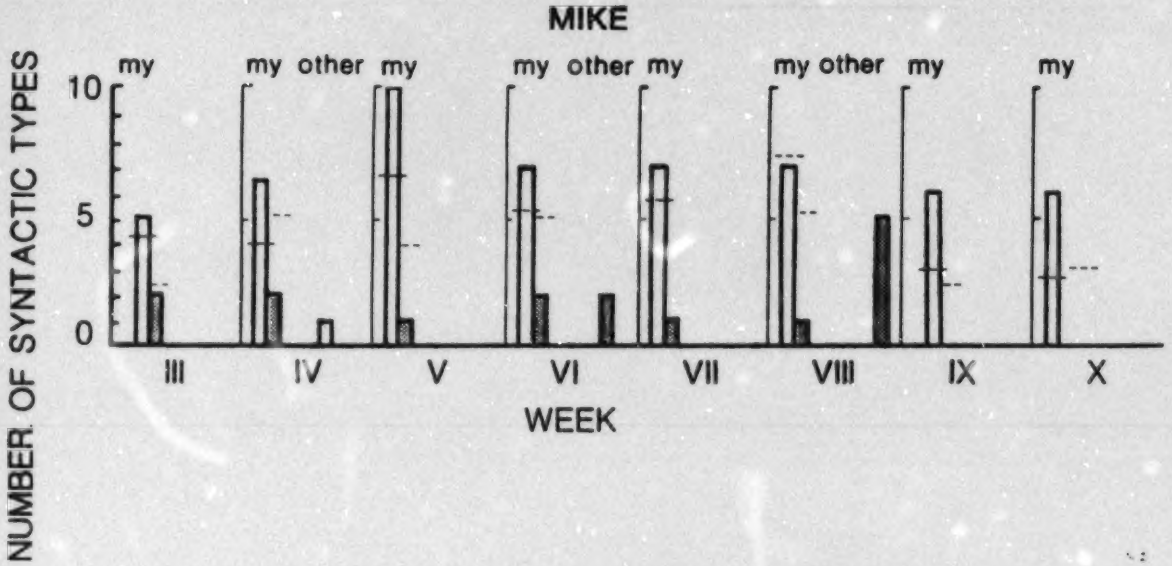


FIG. 6


MIKE
my
my other my
my other my
my other my
my
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5
0
III
IV
V
VI
VII
VIII
IX
X
WEEK
NUMBER OF SYNTACTIC TYPES

FIG. 7

Paper presented at the Annual Convention

of the

American Speech, Language, Hearing Association

Cincinnati, OH, November 15-19, 1984

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